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row areas extending a little west of north and east of south. They represent extremely metamorphosed remnants of the original sedimentary formation.

Lying on the west of the summit of the range and extending parallel with it is a strip of granitic country filled with irregular dikes or veins of coarsely crystallized quartz, feldspar and muscovite; or frequently of feldspar and quartz only, in the latter case taking on a pegmatitic structure. Black tourmaline in irregular crystals is generally characteristic of these dikes.

The rubellite and lepidolite are found associated with an immense dike of this character near Pala, a short distance west of the foot of Smith's Mountain. The dike occurs in one of the norite bosses which forms a high hill over half a mile across. Similar bodies of pegmatitic rock are found in the granite in the vicinity but contain no rubellite. The outcrop is tracible along the eastern slope of the hill for nearly three thousand feet, in places forming a precipitous ledge. It gradually increases in width toward the southern end, where it is three hundred feet across.

It is near one edge of this great mass of pegmatite, and inclosed in it, that the minerals in question occur.

The northern portion of the dike contains no tourmaline; the dominant character being that of a very coarse muscovite granite, with a sprinkling of minute garnets. Both large and small bodies of finely formed pegmatite lie apparently wholly isolated in the coarse granite.

As the dike is followed southward to a point about midway in its course, crystals of black tourmaline begin to appear in abundance. One crystal ten inches long appeared broken into a dozen pieces, which had been moved a slight distance apart but were perfectly angular. The quartz-feldspar matrix showed no signs of crushing, and it is difficult to understand how the appearance could have been produced unless the crystal existed prior to the consolidation of the yielding magma.

Parallelism of the smaller and more slender crystals is often to be observed as taking place about the larger ones. Green tourmaline is present in small amount. It does not generally show any crystalline form, but is disseminated in small granular particles irregularly or aggregated about the black tourmaline.

The lepidolite appears here first in small irregular patches. A few yards to the south it forms a well-defined vein, and is filled with minute needle-like crystals of rubellite. Quartz crystals with fairly well defined boundaries are scattered through it.

At the point where the lepidolite reaches its greatest width, about sixty feet, it contains very little rubellite and is quite massive and pure save for granular aggregates of an acid plagioclase feldspar, probably oligoclase. It is near the southern end of this great body of lithia mica that the rubellite appears in the large radiated aggregates. Fan-shaped clusters of rubellite also occur in the quartz and feldspar adjoining the lepidolite. Single crystals in these groups are often fifteen inches long and one-half inch in diameter. One cavity containing good quartz crystals has been found, and it is possible that with farther exploration gem tourmalines may be found. Many of the smaller crystals in the lepidolite are clear and of good color, but are full of checks.

The rubellite crystals are generally gathered in radial aggregates six inches to a foot in diameter, but sometimes occur singly. Single crystals appear with smaller ones branching from one end presenting a tree-like form, or two or more intersect each other so as to form a cross. The aggregates are sometimes slender, with a slightly wavy course. The crystals either branch outward without any order or they all incline one way, giving the appearance of a fern. In other specimens lines of crystallization radiate from a common centre; curved or club-shaped crystals branching from each line. Hematite is sometimes found coating the tourmaline crystals.

Nine minerals are thus found associated together here—quartz, feldspar, muscovite, garnet, hematite, oligoclase, green, red, and black tourmaline.

A somewhat similar occurrence of minerals is reported from the mountains of Lower California, but nothing is known about it.

The granitic portions of the Sierra Nevada and Peninsula

Ranges contain but few rare or beautiful minerals, and on that account the deposit at Pala is all the more remarkable.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

Snake Story.

APPROPOS of the interesting notes on snakes, lately published in your columns, I would like to relate the following:—

I think it was about the middle of last June that our little boy, who is interested in collecting various natural history objects, brought home a full-grown water-snake. He procured a box of generous dimensions, one whole side of which he covered with wire-screen, such as is used in windows. A small slide was made in the top of the box, so that the porcelain tray (such as photographers use for developing trays), which he placed within, could be kept filled with water, and also for the introduction of food.

This box was thenceforward "the snake den," and here the snake passed the remainder of its existence. A small frog, several grasshoppers, and various insects were dropped through the opening in the top of the box from time to time, but we are not sure whether the snake ever deigned to taste a morsel during her entire captivity; certain it is, however, that if she did finally taste the frog, she did not find it a very appetizing meal, for the little frog hopped about in the box for days and days without any food itself. It was just as apt to rest upon the body of the snake as anywhere else, each seemingly indifferent to the presence of the other. The grasshoppers also were entirely ignored. The snake was left in the box, in the back-yard, during the months of July and August, with no care whatever, we being absent during that time, and the little boy who had agreed to look after it having deserted it.

What was our surprise, after our return early in September, to find one day that Mrs. Snake had giving birth to thirteen little ones. Such a little, writhing, squirming, snaky mass! The little snakes were about five inches long, and soon became quite active. In the course of a few weeks they were much more ready to take their own part than their mother seemed to be. She had probably learned by experience that it was of little or no avail to "fight back," and contented herself with running out her forked tongue when irritated, and then trying to creep out of harm's way. The little ones, on the contrary, would crawl up the screen as far as possible, and when pushed off, with a straw or wire introduced through the screen, they would at once crawl up again, run out their little tongues, and show all the rashness of youth.

Wondering how far the maternal instincts were developed in the mother snake, whether she would try to defend or protect them, the young snakes were frequently irritated, in order to arouse, if possible, her defensive propensities; it was all to no purpose; she seemed a heartless mother, ignoring wholly that her offspring were in danger. A long wire was often thrust into the box, and under a little snake, which could thus be dangled before the old snake in a most irritating manner. But, whether from fear on her own part, or utter indifference to the welfare of her young, she paid no attention whatever to the provocation.

The mother snake lived until the middle of October, when she succumbed to the white frosts of autumn.

A few weeks later two of the young snakes fell asleep; one of them was given to a little schoolmate, who put it in his pocket and took it to school, when, lo! and behold! the warmth from his body resuscitated it, and the "bad boy" played with it in school. To the teacher's question as to what he had, he replied, "A shoestring!"

Learning thus that possibly the remaining little snakes might sleep (hibernate) through the winter, soil, small stones, dead leaves, etc., were placed in the box, and they crept away out of sight. Whether they are dead, or only sleeping, we do not know. They

lived, however, some seven or eight weeks, were active, seemed well and happy (?) and, as far as we know, never ate a mouthful of anything during the entire time. I neglected to mention that the old snake shed her skin once during her captivity, unfortunately, it was during our absence, and we did not witness the operation.

It certainly seems strange that, with so much fasting, they none of them should look thin and poor, but should apparently grow and increase when having consumed nothing.

MRS. W. A. KELLERMAN,

Columbus, O., Jan. 9.

Geographical Variation in Birds.

IN your issue of Jan. 6 there appears a communication entitled "Geographical Variation in Birds," containing several remarkable statements, two of which I would like to correct. In speaking of "desert coloration," this writer says: "If the scorching sun of the desert regions will bleach out one species, why will it not do the same for another? The plea of adaptation of coloration for protection cannot be urged here." Such a conclusion does not follow, and the plea of protective coloration might reasonably be made, because the "bleaching" of which he speaks did not take place during one summer, but is the result of natural selection for an unknown number of generations, and, while in some species this protective coloration has proved beneficial, it does not follow that in other species with different habits natural selection would work along the same lines.

But this is only a slight error compared to the following astonishing paragraph, which I quote in full, the italics being my own:—

"Not only are colors affected, but size as well, by geographical position. This is probably more marked north and south than east and west. *And yet the variation in size alone is not sufficient for a sub-specific division* It is not at all strange that those individuals of a migratory species which push farthest north should possess stronger bones and muscles and so be larger than those which were not able to fly so far. It would seem natural that the constant recurrence of such a difference would tend in time to form a race peculiar enough to be recognized as a sub-species. *But it has not proven true thus far in the history of the world, and why should there be any change under the same conditions?*"

If the above quotation means anything, it is that the author believes increase in size to be more or less general and due to the longer migrations of originally stronger individuals, and yet that this process of selection has not up to this time produced even a tenable sub-species! Considering these two unique ideas in reverse order, let us see whether there are not some species, or at least sub-species, based solely on an increase or decrease in size. Hastily running over the list of North American birds, we find the following interesting facts: *Troglodytes alascensis* is accepted as a different species from *T. hiemalis*, but the variation is only in the size. *Accipiter velox* differs from *A. cooperi* practically in size only. *Totanus melanoleucus* and *T. flavipes* are described by Coues as "precisely the same" except for size. And, lastly, *Rallus virginianus* is "a perfect miniature" of *R. elegans*, being about forty per cent smaller.

In addition to these species, we find there are at least sixteen sub-species which differ from the original stock only in size. About half of these vary from east to west, the others north and south. Furthermore, as Dr. Coues so truly says, many American representatives of European species are "larger and better birds" than their foreign relatives, but we will not include them here, because there are generally some slight differences in coloration as well. So much for the existence of sub-specific variation in size; now, as to the idea that this increase is due to migration. If it is so, how will we account for the cases already given in the genera *Accipiter* and *Totanus*, where the differing species have practically a co-extensive range; or for the even more difficult case of *Rallus*, in which the smaller species is a much more northern bird? But the best illustration to show the fallacy in both ideas is *Dryobates villosus*. Here we have a widely distributed bird, a resident, not a migratory species, which has two accepted

sub-species based solely on variation in size: the northern form, *D. v. leucomelas*, larger than normal, and the southern form, *D. v. audubonii*, smaller. How can this be accounted for on the proposed "migration" theory? To sum up the whole matter, it is probable that northern birds will average larger as a rule, especially in resident species, as they are thus better fitted to stand the severity of the climate and the other difficulties of boreal existence. Furthermore, it can hardly be denied that variation in size is in a number of cases not only sufficient to denote a sub-species, but, occasionally, where the connecting links have disappeared, to form what is universally considered a distinct species.

HUBERT LYMAN CLARK.

Pittsburgh, Pa., Jan. 13.

Pseudoaurora Not Shadows.

THE explanation of the phenomena reported by me in *Science*, issue of the 16th of December, is altogether too common an observation to leave any doubt of its failure to clear up the mystery. My calling has made me very familiar with all of the "shadows cast upon the fog by projecting arms or objects in the beam from the light," as "seen at any time when there is smoke, light fog, or mist."

The phenomena which I described was entirely new to me, and apparently distinct from *shadows* of any kind, consisting of pencils of light radiating upward from a dark arc, the centre of which was somewhat east of north, the pencils constantly changing in length, and having an apparent movement laterally precisely like those of the ordinary northern lights while I remained standing still. The characteristic coloration of the pencils was unmistakable, but not as distinct as I have sometimes seen it. I have seen the "shadows" so often under similar circumstances of smoke, fog, and mist, that I should scarcely have noticed the matter but for the dark arc with its superimposed luminous arch and the radiations described. But I spent considerable time, in making the different observations mentioned before, and took in the familiar shadows that impress the mind of Professor Hazen so strongly.

P. L. HATCH.

Anacortes, Washington.

Natural Selection at Fault.

WE are generally told by orthodox Darwinians that both the structure and the actions of animals are to a great extent dependent upon natural selection. Any organ, or any habit which is not advantageous to its species will be, it is said, promptly suppressed as a possible danger, or at least, an unremunerative demand.

Yet there are a few cases of habits which seem to have been acquired or maintained in flat contradiction to this doctrine. Every one knows that the *Felidae*, from the Bengal tiger down to our domestic mouser, when they have seized a prey do not at once kill and devour it, but either torment it or at least sit and watch it for some time before administering the fatal bite or blow. The consequence is that the victim sometimes escapes, as we all have witnessed, when pussy is playing with a mouse. One instance at least is on record where a man, struck down by a tiger, quietly drew a dagger and stabbed the assailant to the heart. This could not have been done with a beast of prey of the canine or ursine family, as they do not allow time for devising and executing such a manoeuvre. Hence we see that the peculiar conduct of the cats is disadvantageous to themselves, and we ask why it has not been abandoned. Certainly any cat which should at once devour any mouse or bird which it had caught would, in times of scarcity, have a decided advantage over its fellow cats.

Similarly injudicious is the conduct of the domestic hen. As soon as she has laid an egg she at once announces the fact to all whom it may concern by her well-known cackling. What benefit is this outcry to herself or to her species? On the contrary, the outcry is heard by animals which are given to stealing eggs and is understood by monkeys, if we may accept the evidence of La Vaillant. There again, therefore, we have a line of conduct quite contrary to what natural selection would determine.